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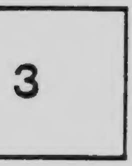

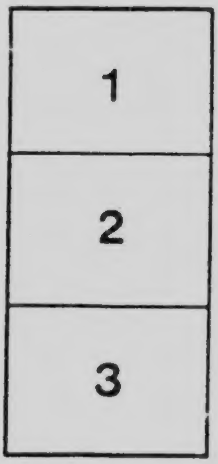

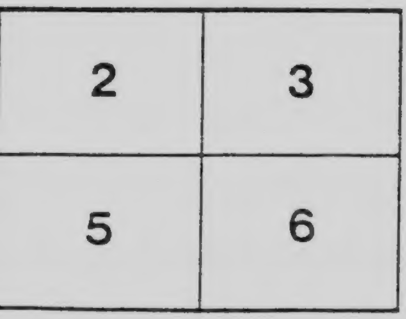

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VICTORI

Vol. I, No. 1

ORBIT OF THE SPECTROSCOP

BY REYNOLD K.

The star H.R. 8800 (R.A. (1900) 23^h $02{\cdot}7^m$,
spectroscopic binary by the writer in 1918 fron
72-inch reflector. These plates indicated that t
oscillate with the other lines and an orbit was ur
spectrum is approximately B3 type. All the lin
and wide though the latter lines are better than t
to that of H.R. 8427 whose orbit has just recentl

The orbit is based on 27 single-prism pla
These plates are taken in three years and henc
in the least squares solution. The approxima
With the aid of this period the observations were
below. This procedure is not theoretically soun
up a normal have different values for the differ
but practically, if a normal place includes only
as rigid as if each place is treated separately and

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OSCOPIC BINARY H.R. 8800.

OLD K. YOUNG

02·7^m, $\delta = +45° 33'$) was discovered to be a
18 from five one-prism plates taken with the
that the H and K lines of calcium did not
was undertaken chiefly on this account. The
the lines including H and K are rather diffuse
than the others. The spectrum is very similar
recently been finished.

m plates listed in the table of observations.
l hence it was necessary to include the period
roximate period was selected as 3·337 days.
ns were grouped into 16 normal places as given
y sound as the observations which go to make
differential coefficient determining the period
only a few revolutions, the solution is almost
ly and the labour is greatly reduced.

OBSERVATIONS OF H.R. 8800

Plate	Date	Julian Day	Velocity	No. of Lines	Wt.	Phase from T	O–C	K Line
	1918							
370	July 16	2,421,791·968	− 39·9	3	1	1·114	− 6·0	−16·8
421	" 30	1,805·950	+ 25·5	3	1	1·747	− 5·1	....
566	Sept. 5	1,842·898	+ 49·2	3	1	1·986	+ 2·0	....
885	Nov. 20	1,918·644	− 57·9	6	1	0·976	− 6·9	+ 0·4
1129	Dec. 23	1,951·567	−128·6	3	½	0·527	−24·2	− 4·8
	1919							
2319	July 8	2,148·957	− 43·8	7	1	1·022	+ 1·2	− 4·5
2333	" 9	2,149·945	+ 40·6	3	1	2·010	− 8·4	−18·0
2360	" 13	2,153·954	+ 68·6	3	1	2·682	+18·2	− 0·1
2395	" 15	2,155·961	− 15·5	5	1	1·352	− 8·7	+ 8·7
2445	" 19	2,159·969	+ 56·8	4	1	2·023	+ 6·8	−23·7
2464	" 20	2,160·966	− 7·2	4	1	3·020	− 6·4	− 6·9
2521	" 23	2,163·963	....	......	0	2·679	....	....
2607	Aug. 6	2,177·957	− 85·6	5	1	3·325	−10·1	−16·8
2620	" 7	2,178·924	− 55·2	4	1	0·954	− 2·2	....
2655	" 10	2,181·911	− 82·6	6	1	0·604	+13·4	−14·2
2696	" 14	2,185·955	− 0·5	4	1	1·311	+10·7	....
2753	" 19	2,190,772	+ 45·8	5	1	2·791	+ 5·8	−17·1
2763	" 19	2,190·903	+ 14·0	6	1	2·922	− 5·6	− 8·5
2767	" 19	2,190·969	+ 14·6	3	1	2·988	+ 8·6	....
2782	" 20	2,191·919	− 96·1	3	1	0·601	+ 0·7	− 3·7
2778	" 20	2,191·822	− 97·1	3	1	0·504	+ 8·9	....
2793	" 21	2,192·902	+ 31·3	1	½	1·584	+14·6	....
2810	" 22	2,193·890	+ 50·4	3	1	2·572	− 4·7	+ 0·4
	1920							
4631	July 14	2,520·954	+ 49·0	7	1	2·590	− 7·8	....
4650	" 18	2,524·963	− 58·7	4	1	3·262	+ 1·3	− 6·7
4702	" 25	2,531·906	−114·1	5	1	0·193	− 2·4	−20·7
4703	" 25	2,531·927	−115·5	6	1	0·214	− 5·5	−11·8
4728	" 27	2,533·908	....	......	0	2·195	....	....
4739	" 28	2,534·932	− 24·8	3	½	3·219	+24·2	....

NORMAL PLACES

	Mean Epoch Julian Date	Phase from Final T	Velocity	No. of Obser- vations	Wt.	O–C Prelim.	O–C Final.	pv^2 Prelim.	pv^2 Final.
1	2,421,791·968	1·114	− 39·9	1	½	− 1·4	− 6·0	1	18
2	1,805·950	1·747	+ 25·5	1	½	− 6·6	− 5·1	22	13
3	1,842·898	1·986	+ 49·2	1	½	− 1·7	+ 2·0	2	2
4	1,918·644	0·976	− 57·9	1	½	− 3·1	− 6·4	5	20
5	1,951·567	0·527	−128·6	1	¼	−22·4	−24·2	125	146
6	2,191·888	0·570	− 91·9	3	1½	+ 9·3	+ 8·5	131	107
7	2,178·957	0·987	− 49·5	2	1	+ 2·0	+ 0·1	4	0
8	2,185·975	1·331	− 8·0	2	1	+ 1·0	+ 0·9	1	1
9	2,192,902	1·584	+ 31·3	1	¼	+12·5	+14·6	39	53
10	2,159·962	2·016	+ 48·7	2	1	− 5·3	− 0·2	28	0
11	2,193·999	2·681	+ 54·9	3	1½	+ 6·2	+ 4·6	57	31
12	2,190·957	2·976	+ 7·2	3	1½	+ 8·0	− 1·9	84	6
13	2,177·957	3·325	− 85·6	1	½	− 2·5	−10·1	3	51
14	2,520·954	2·590	+ 49·0	1	½	− 6·3	− 6·1	20	18
15	2,531·916	0·203	−114·8	2	1	− 1·7	− 4·6	3	22
16	2,534·960	3·234	− 47·4	2	¾	+23·9	+ 5·9	429	28
							Σ	954	516

The following preliminary elements were selected as a basis for the least squares solution

$$
\begin{aligned}
P &= 3\cdot337 \text{ days}\\
e &= 0\cdot20\\
\omega &= 120^\circ\\
T &= \text{J.D. } 2{,}422{,}151\cdot200\\
K &= 90 \text{ km.}\\
\gamma &= -16\cdot2 \text{ km.}
\end{aligned}
$$

The residuals left in the normal places from these elements are given in the table under the heading, O–C preliminary. Observation equations were next formed and the solution gone through in the usual way. The changes in the elements are rather larger than usual and the residuals computed from the ephemeris differed in some cases from that computed from the observation equations. The solution resulted in a lowering of Σpv^2 from 954 to 516 so that a second solution would probably improve the residuals still further. As will be seen from the probable errors of the elements the changes of the present solution are of the same order as these and as the next solution would probably result in much smaller changes, they may be taken as negligible. The several steps in the solution are recorded.

OBSERVATION EQUATIONS

1	1·000x	−1·076y	−0·389z	−0·854u	+0·278v	−0·212w	+ 1·72	= 0
2	1·000	−1·001	+0·262	+0·410	−0·448	−0·180	+22·35	
3	1·000	−0·945	+0·362	+0·609	−0·526	+0·052	− 9·32	
4	1·000	−0·430	+0·771	+0·851	−0·714	−0·332	+ 3·14	
5	1·000	−0·392	+0·783	+0·857	−0·713	+0·040	− 1·95	
6	1·000	−0·245	+0·816	+0·683	−0·704	−0·506	+ 1·35	
7	1·000	+0·082	+0·810	+0·120	−0·648	+0·045	− 0·95	
8	1·000	+0·388	+0·699	−0·478	−0·558	+0·047	−12·53	
9	1·000	+0·536	+0·598	−0·740	−0·497	−0·343	+ 6·59	
10	1·000	+0·746	+0·361	−0·972	−0·362	−0·223	+ 1·70	
11	1·000	+0·780	+0·302	−0·975	−0·327	+0·006	+ 5·29	
12	1·000	+0·794	−0·621	+0·426	+0·438	−0·324	+ 6·26	
13	1·000	+0·721	−0·744	+0·695	+0·590	−0·051	− 6·21	
14	1·000	+0·172	−1·136	+1·037	+1·250	−0·100	− 7·96	
15	1·000	−0·612	−1·032	−0·529	+1·236	−0·949	−23·92	
16	1·000	−0·744	−0·938	−0·806	+1·096	−0·059	+ 2·48	

where

$x = d\gamma$

$y = dK$

$z = Kd\omega$

$u = Kde$

$$v = \frac{K\mu}{(1-e^2)^{\frac{3}{2}}}\, dT$$

$$w = \frac{K\, d\mu}{(1-e^2)^{\frac{3}{2}}} \times 500$$

NORMAL EQUATIONS

12·750x	−0·970y	−0·811z	+1·967u	+0·865v	−1·910w	−35·850	= 0
	+5·796	−0·590	−0·278	+0·609	+0·402	+14·693	
		+6·920	−0·597	−6·872	+0·789	+32·785	
			+7·390	+0·469	+0·282	−23·637	
				+7·056	−0·942	−36·055	
					+1·077	+13·089	

$x = +1{\cdot}07$

$y = -2{\cdot}30$

$z = +8{\cdot}91$

$u = +2{\cdot}93$

$v = +12{\cdot}94$

$w = -5{\cdot}37$

$d\gamma = +1{\cdot}07$

$dK = -2{\cdot}30$

$d\omega = +5^\circ{\cdot}67$

$de = +{\cdot}0326$

$dT = +{\cdot}0718$ day

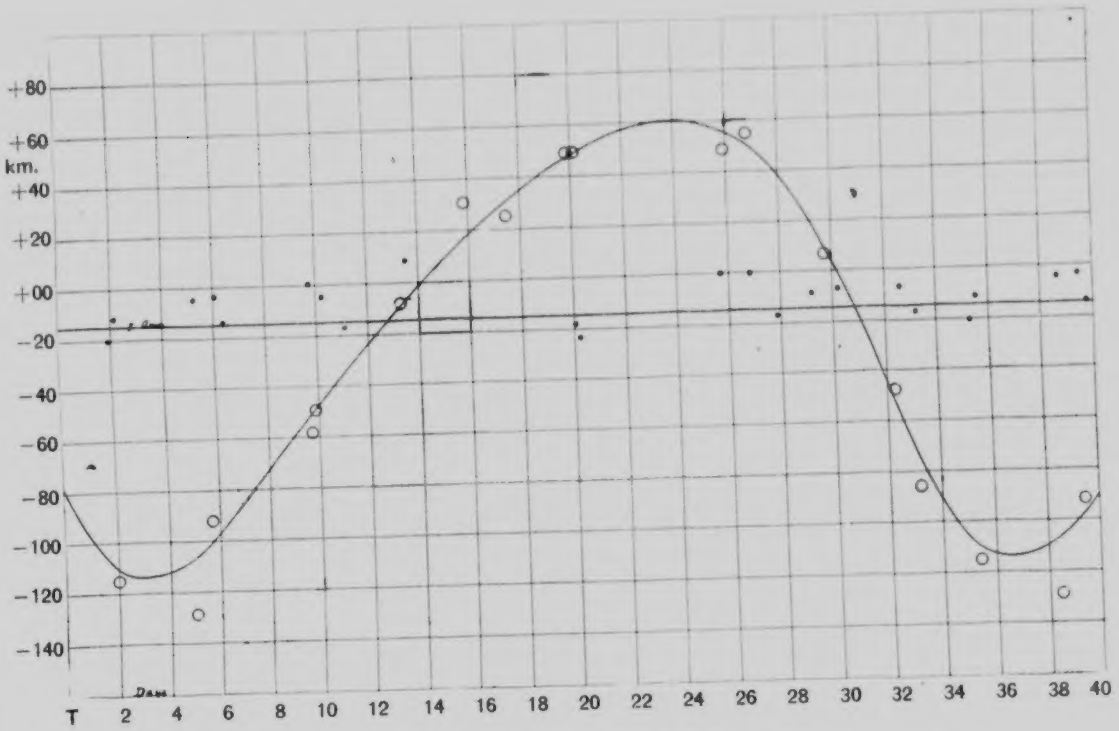
$dP = +{\cdot}00020$ day

The final elements with their probable errors are

P = period	= 3·3372 days	±0·00023
e = eccentricity	= ·2326	±0·022
ω longitude of periastron	= 125°·67	±7°·08
K = semi-amplitude	= 87·70 km.	±2·68
T = periastron passage	= J.D. 2,422,151·272	±0·0623
γ = velocity of system	= −15·13 km.	±1·79
V = velocity of Calcium	= −9·1 km.	±1·39

$a \sin i$ = 3,910,000 km.

$$\frac{m^3_1 \sin^3 i}{(m+m_1)^2} = 0{\cdot}215\ \odot$$



Radial Velocity Curve of H.R. 8800

Open circles represent normal places. Small circles represent velocities from H and K lines.

Dominion Astrophysical Observatory,
Victoria, B.C.
August 26, 1920.